Universität Basel

Research Project

Spatial and temporal activation of Nonmuscle Myosin II during asymmetric stem cell division; Ausarbeitung ERC starting grant

Third-party funded project

Project title Spatial and temporal activation of Nonmuscle Myosin II during asymmetric stem cell division; Ausarbeitung ERC starting grant
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Asymmetric cell division generates cellular diversity. The correct positioning of the cleavage furrow is one cellular mechanism, ensuring asymmetric partitioning of cell fate determinants and the establishment of cell size differences. However, the underlying molecular mechanism remains elusive. Furthermore it is not known whether cell size differences are influencing cell fate decisions.
Recently, I demonstrated that Nonmuscle Myosin II (henceforth called Myosin), a key component of the cleavage furrow, becomes asymmetrically localized in Drosophila melanogaster neuroblasts (neural stem cells of the fly). The underlying cellular and molecular mechanism is unknown. Here I propose to investigate the spatial and temporal activation pattern of Myosin and outline strategies to construct a novel set of Myosin biosensors. We will use recently generated antibodies against the mono and diphosphorylated state of Myosin, as readout for activated Myosin in asymmetrically dividing Drosophila neuroblasts. Furthermore, we will construct a novel set of Myosin biosensors, which will be used in live imaging experiments. These Biosensors will be tested in a Drosophila cell culture system. Ultimately, these biosensors will be used for live imaging experiments in asymmetrically dividing neuroblasts, to accurately measure the activation status of Myosin with high spatial and temporal resolution.
These experiments will establish a preliminary dataset, allowing us to provide a proof of concept that the experimental strategy is working.
The proposed research is highly relevant. Stem cells divide asymmetrically, generating a selfrenewed stem cell and a differentiating sibling in the process. Thus, in order to exploit their enormous therapeutical potential, a thorough understanding of the underlying molecular mechanism is required.

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